

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 21 MAR 2005

PCT

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2004/036426

International filing date (day/month/year)
01.11.2004

Priority date (day/month/year)
30.10.2003

International Patent Classification (IPC) or both national classification and IPC
C12Q1/68

Applicant
NORTH CAROLINA STATE UNIVERSITY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized Officer

Mueller, F

Telephone No. +49 89 2399-7722



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/036426

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/036426

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or
industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-38
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-38
Industrial applicability (IA)	Yes: Claims	1-38
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V.

1 Reference is made to the following documents:

D1 : PARK S-J ET AL:SCIENCE, vol. 295, 22 February 2002, pages 1503-1506

D2 : WO 99/51778 A

D3 : WO 98/04740 A

The subject-matter of claim 1 is not inventive (Article 33(3) PCT).

Present claim 1 describes a method for detecting target sequences by the use of a capture probe immobilized onto an electrode, nanoparticle-labelled target molecules and the use of an redox solution which induces an electrical signal in the electrode.

D1, a document in the field of detecting nucleic acid hybridization, describes the use of capture probes which are immobilized onto an electrode and hybridized to complementary target sequences which comprise an attached nanoparticle. The hybridization of the two nucleic acid strands are measured by the use of an AgNO₃/hydroquinone solution, see p.1504, 1. col., 2. par.. The method of D1 therefore is considered to provide already a method which enables the detection of target/probe hybridization by the use of an electrode.

D2, a document in the field of electrochemical sensors, describes a method for detecting target sequences by forming nucleic acid duplexes onto an electrode surface and by adding an intercalative redox-active compound which enables the measurement of an electron transfer, see e.g. claims and examples. The disclosure of D2 is considered to already provide a method for the detection of target sequences with the use of an electrode.

D3, a document in the field nanoparticles and nucleic acid detection, already provides a method for the detection of target/probe hybridization by using nanoparticles, see e.g. figures and claims.

All the essential technical features of present claim 1 are already provided in the prior art (D1-D3), furthermore no special technical effect of the present claimed method could be

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2004/036426

identified in comparison with the prior art (D1-D3) which would allow the acknowledgement of an inventive step. Article 33(3) PCT is thus not fulfilled.
The same holds true for thereon dependent claims 2-38.

The following has also to be considered:

- The wording "sacrificial" in claim 32 is considered not to be a technical expression and therefore renders the scope of the claim unclear (Article 6 PCT).
- The vague and imprecise statement "It will be understood..." in the description on page 58, lines 12-15, implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in a lack of clarity (Article 6 PCT) when used to interpret them (see also PCT Guidelines, C-III, 4.3).
- Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D3 is not mentioned in the description, nor is/are this/these documents identified therein.